FRAP Assessment: Inventory and Monitoring for Climate Change Analysis

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Visit our web site at: http://frap.cdf.ca.gov or http://www.fs.fed.us/r5/rsl/projects/mapping/zone-map.shtml

FRAP MANDATE
PRC 4789

- Mandates an Assessment of Forest Resources to guide forest policies for the State.
    - An assessment and analysis of the supply and availability of forest and rangeland resources of the state
    - A discussion of important policy considerations, laws, regulations, management responsibilities, and other factors expected to influence and significantly affect the use, ownership, and management of forest and rangeland resources.
- Systematic overview of the status and trends on CA forests
- Forest condition and extent
- Trend analysis and reporting

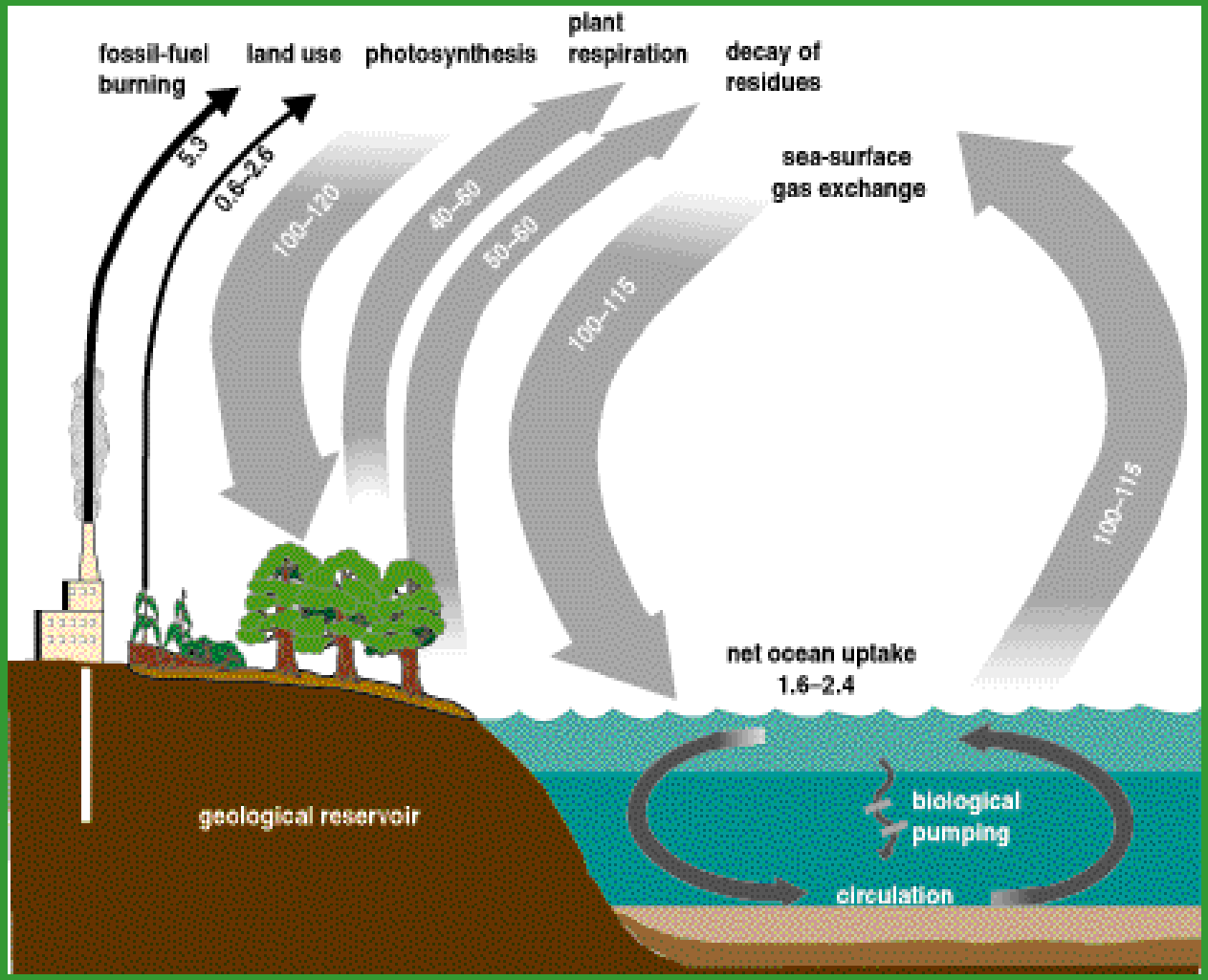
FRAP Assessment Climate Change Chapter

Provides a review of climate change impacts on forest and range lands in California.

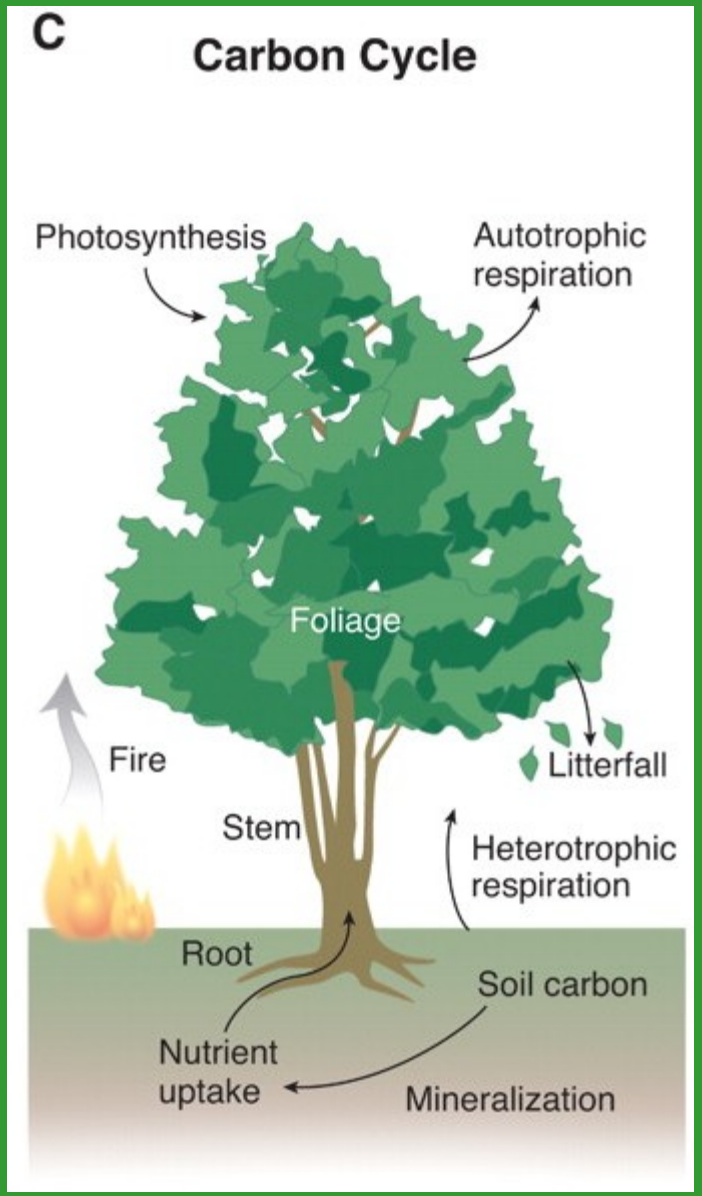
Topics covered

- Overview of the forest carbon cycle
- Forest disturbance and emission sources
- Forest and Range response to climate change
- Government response to climate change
- Policy choices

Global Carbon Cycle



Source: Oak Ridge National Labs



Forest Carbon Pools

- Bole
- Branch and Leaf Foliage
- Roots
- Down Woody Debris
- Soil Organics*

G. B. Bonan Science 320, 1444 -1449 (2008)

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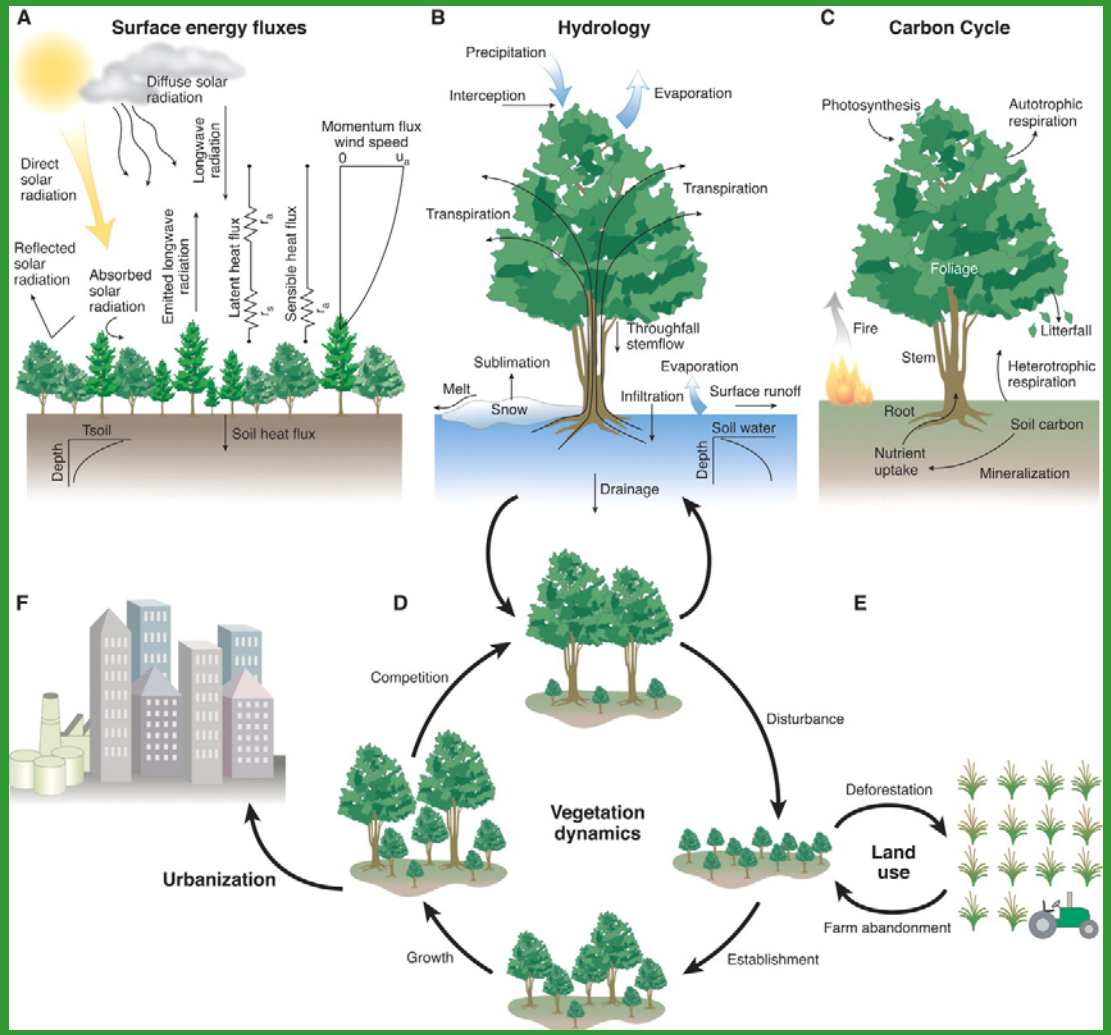
Fig. 2. The current generation of climate models treats the biosphere and atmosphere as a coupled system



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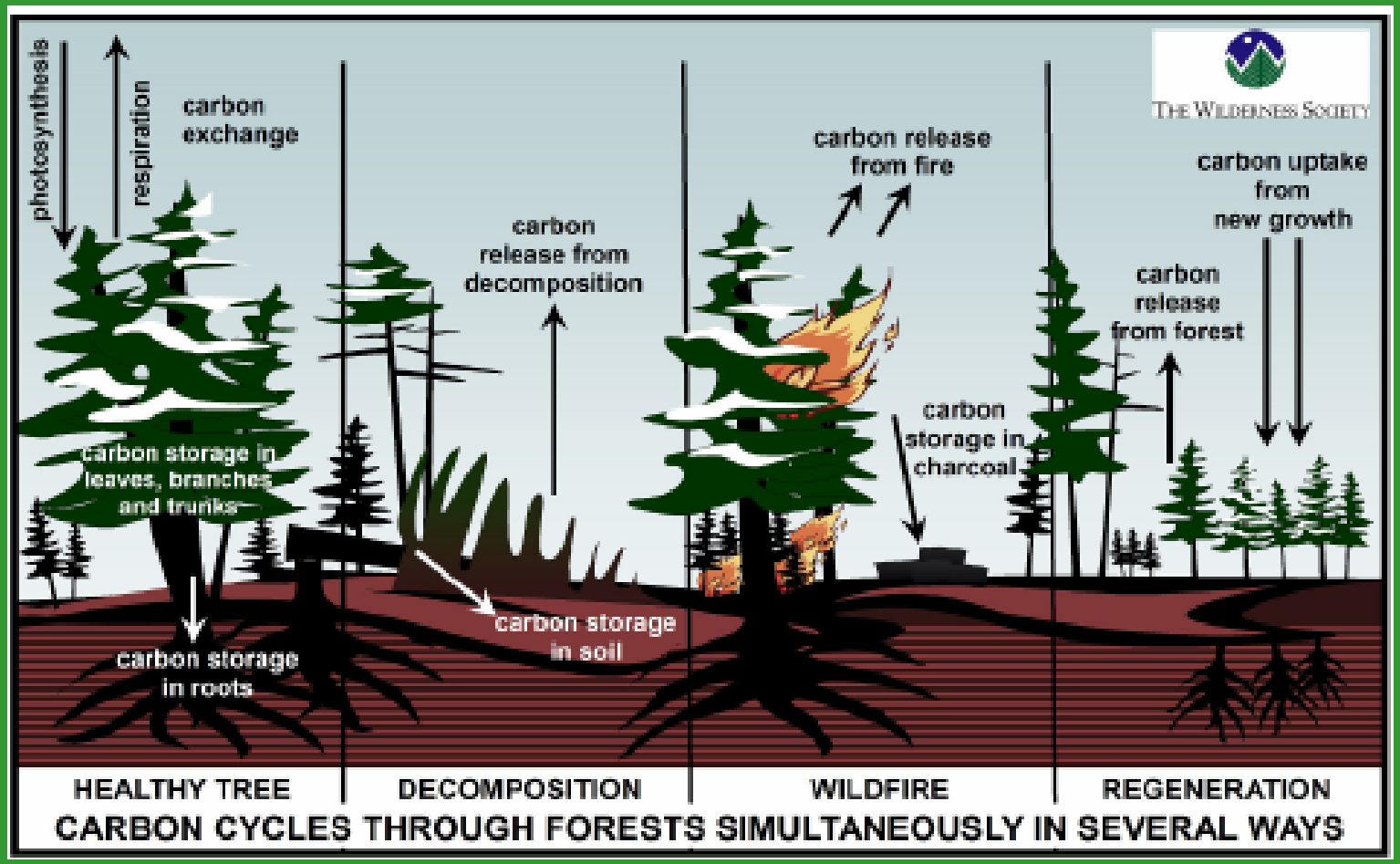
Carbon Pools in Forests



Source: The Wilderness Society

FRAP Assessment Mapping and Monitoring Strategy

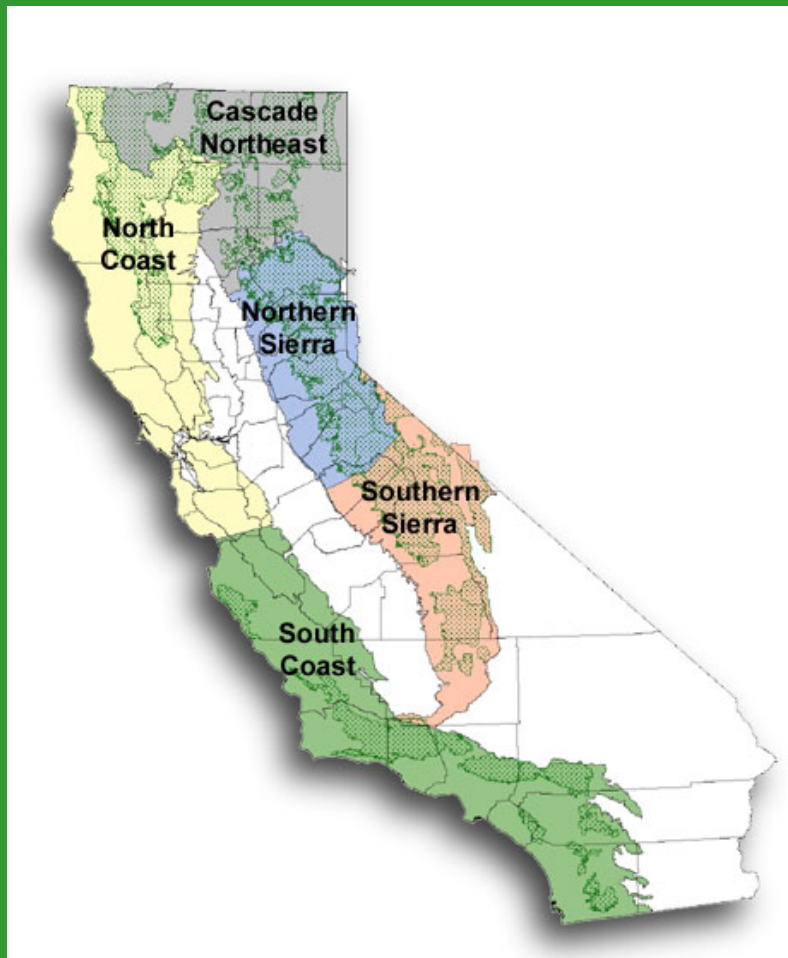
CA Land Cover Mapping and Monitoring Program (LCMMP) provides data and analysis via WWW

- Cooperative Among CAL FIRE and USFS
- Data for Forest and Rangelands
- Vegetation Mapping Component
- Vegetation Monitoring Component
- Coordinated Schedule

5 Year Mapping and Monitoring Schedule

- Activities include:
  - Vegetation Mapping
  - Change Detection
  - Map Updates
  - Inventory Links (FIA)
  - Trend Analysis

- Private land data from 1997-2002
- NFS land data from 1999-2004
- Some areas not mapped
  - Central Valley
  - Desert
  - Counties of San Luis Obispo and San Benito



Land Cover Monitoring

Methods

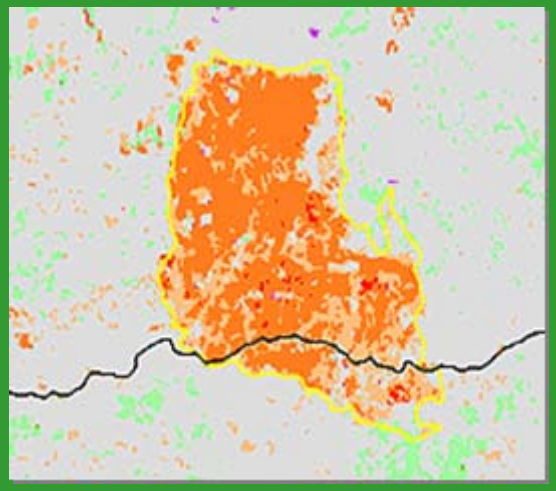
Time 1 Image

Red is a presence of vegetation

Time 2 Image

Gray is an absence of vegetation

Change Detection Map



Decrease in vegetation cover

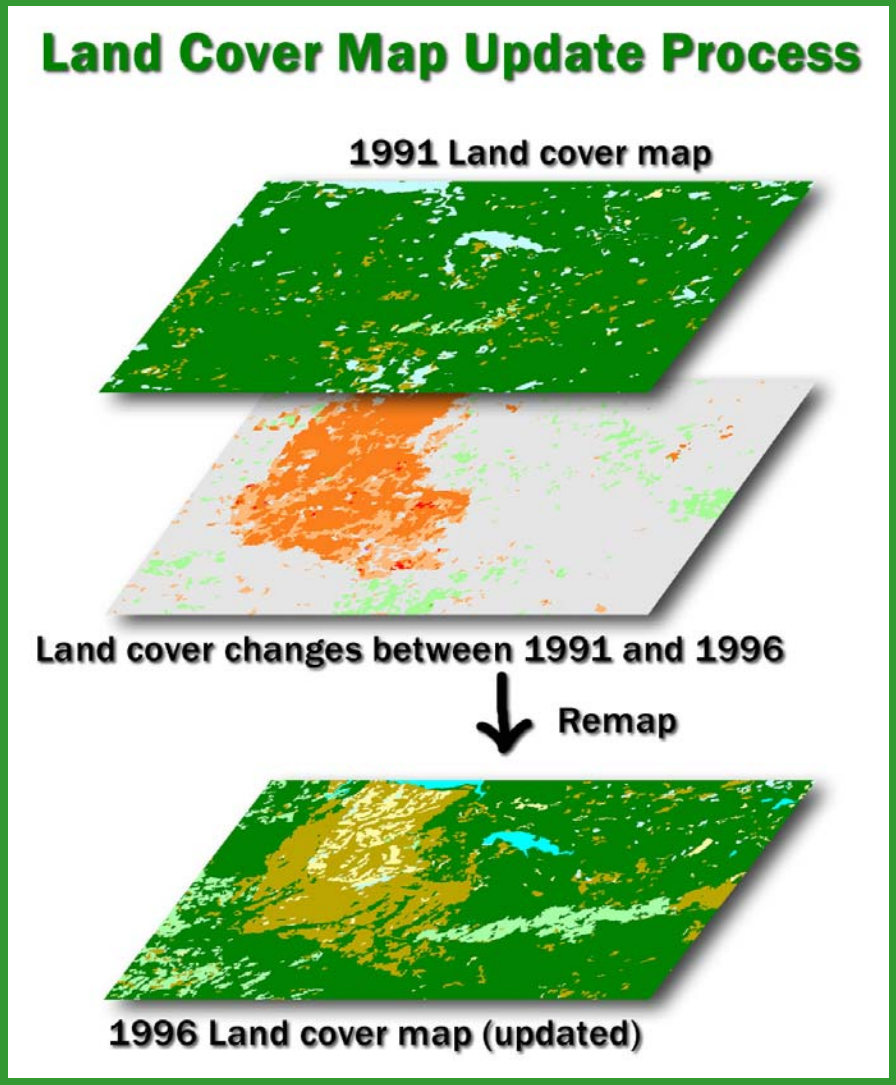
Increase in vegetation cover

No change in vegetation cover

- **Multi-temporal Kauth-Thomas (MKT) transformation reduces 12 bands of TM data to three differenced components called Brightness, Greenness, and Wetness (BGW)**
- **Supervised classification on ΔBGW image reduces redundant data**
- **Aerial photos, field data, other imagery sources used to classify change**

LCMMP
CA Land Cover Mapping and Monitoring Program

LCMMP Coming Together



- Establish Baseline Vegetation Information
- Re-map only where changes are identified
- Vegetation updated every 5 years

Land Cover Monitoring

Identifying Causes of Change is facilitated by tracking activities such as wildfire, harvesting, and insect and disease outbreaks using GIS

- Wildfire
- Rx burn
- Mortality
- Harvesting
- Thinning
- Regeneration
- Development
- Conversion
- etc.

LCMMP
CA Land Cover Mapping and Monitoring Program

Land Cover Monitoring

Identifying Causes of Change Using GIS: North Sierra 2000-2005

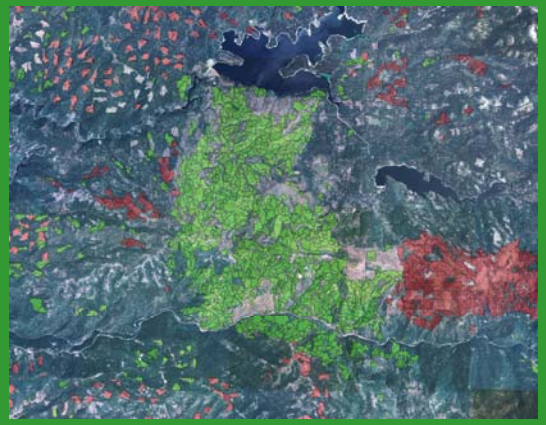
2005 Air Photo

Fire Perimeters

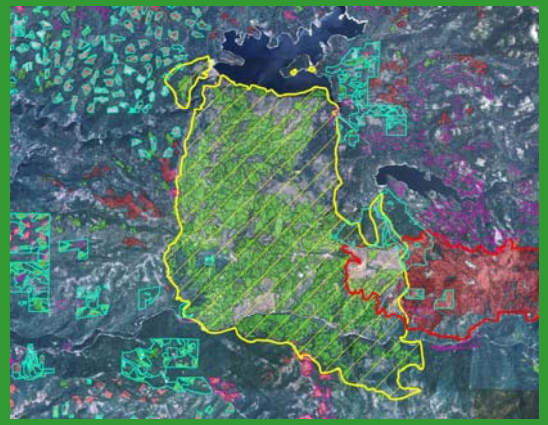
THP 1996-1999

THP 2000 - 2005

Change Data 2000-2005

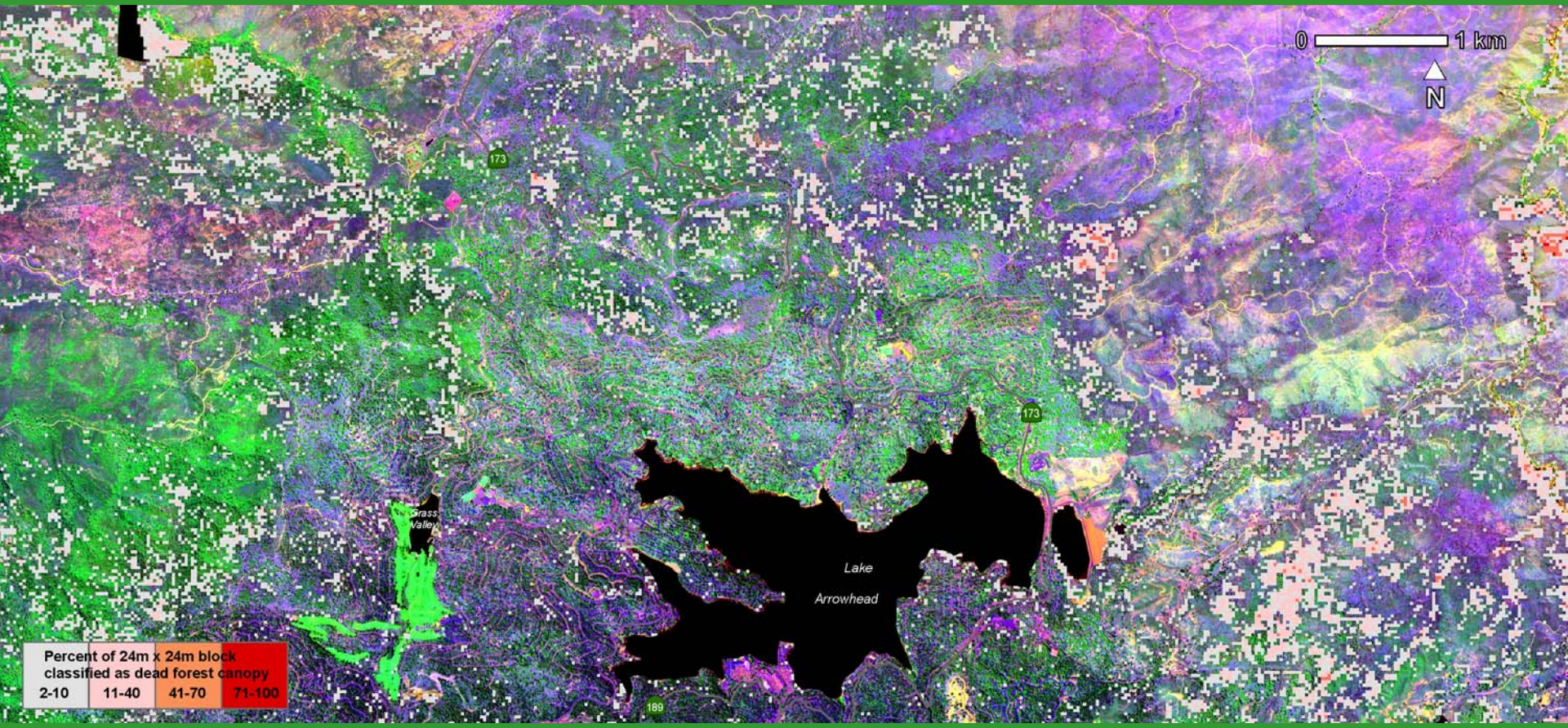


Cause of Change



Trends in Forest Mortality:

2007 Southern California Tree Mortality



USDA Forest Service - Pacific Southwest Research Station - Forest Fire Laboratory, Riverside, CA

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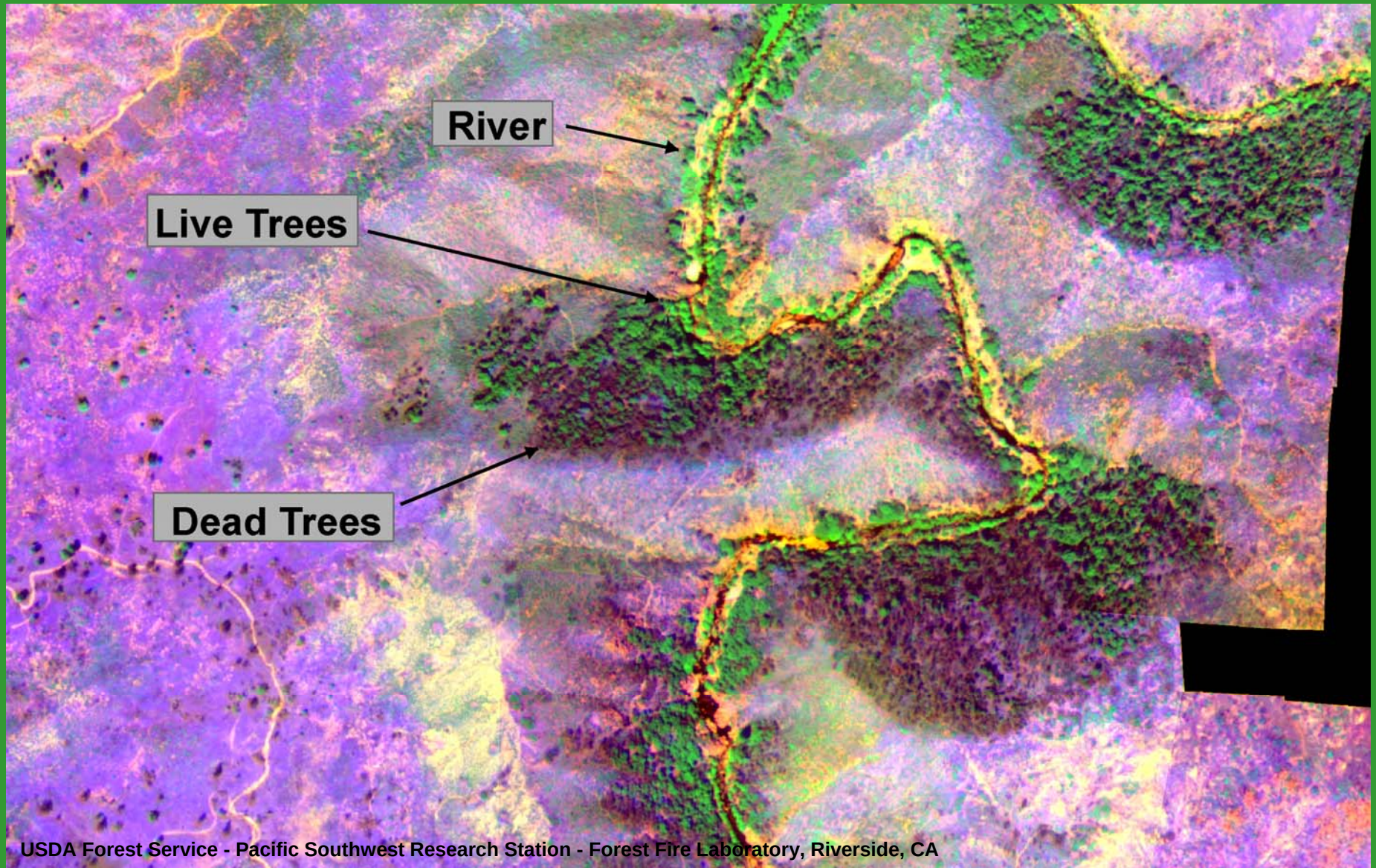

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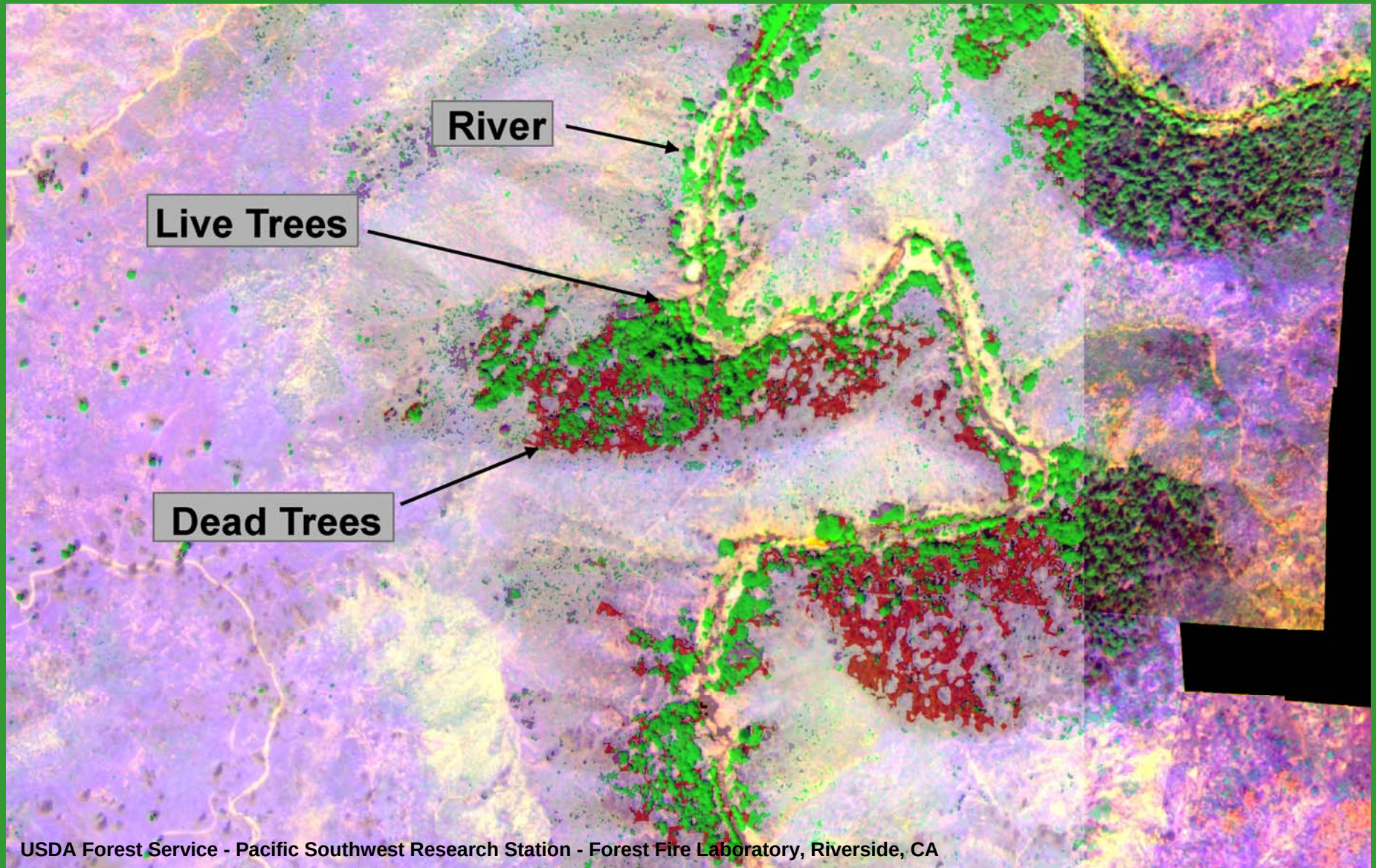

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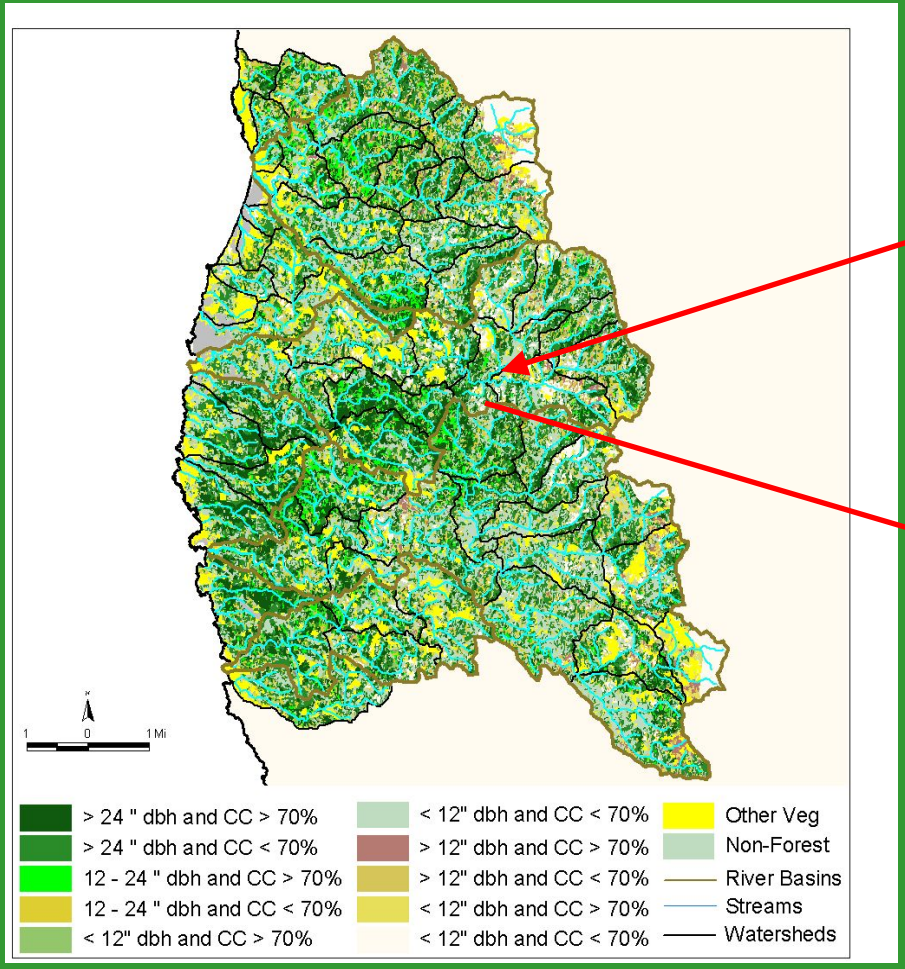
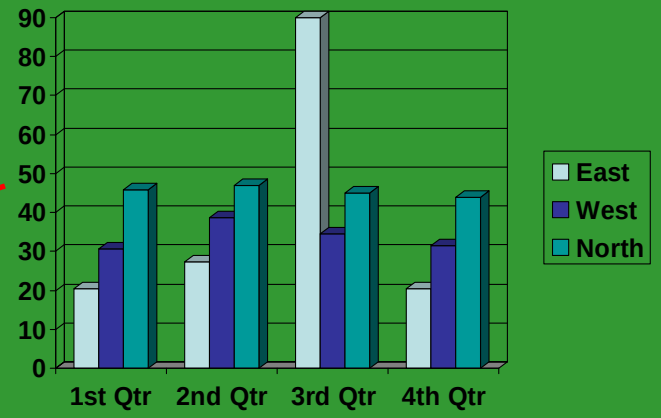
Quantify the Distribution of Conifer and Hardwood by size and cover

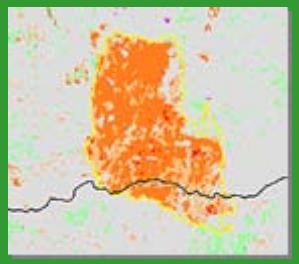


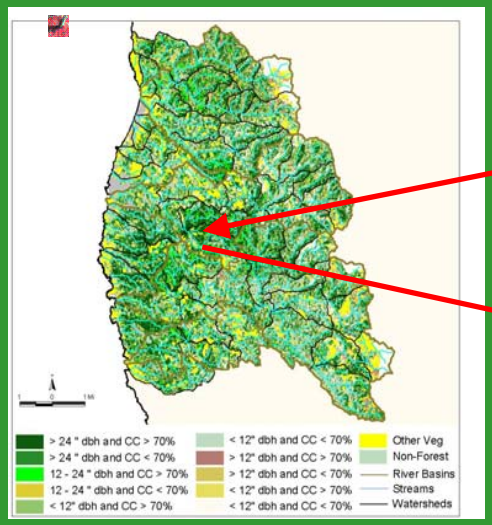


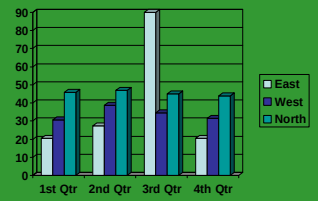
Applications Using Mapping and Monitoring Data

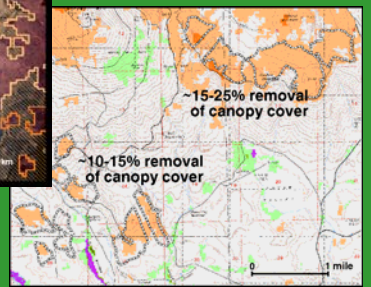
Assessing Wildlife Habitat
Monitoring Forest Management
Hazardous Fire Fuels Mapping
Post-Fire Vegetation Characteristics
Trends in Forest Mortality
Quantifying Watershed Characteristics
Climate Change???

Elements of a Forest and Range Carbon Accounting System









System Elements

- Extending the Traditional Forest Inventory
- Assessing the Accuracy of Carbon Estimates
  - Desired Accuracy
  - Estimation Bias
  - Estimation Precision
- Each Component
  - Weighted by Contribution
- Requires Detailed Analysis

Components

- Survivor Tree Growth
- Mortality
  - Background
  - Catastrophic
- Ingrowth
- Removals
  - Long-term Storage
  - Emissions

Components (cont.)

- Regeneration
  - After-Harvest
  - Forestation
- Soils
- Dead Wood
  - Standing
  - Down
- Leakage, Life-Cycle, and Flux???

Suggested Next Steps

- Interagency Committee
  - Conduct Needs Assessment
  - Develop Methods for Statewide System
  - Report Back to BOF and ARB
    - Recommendations for System
    - 6-12 Months
- Pilot to Evaluate Accuracy & Efficiency
  - 24 Months
- Resource Needs

FRAP Role

- Consistent with Assessment Mandate to monitor forest and rangelands.
- Experience and Expertise to Manage
  - In Cooperation with USDA Forest Service
- Efficiencies with Other Projects
- Subject to Final System Design & Resources